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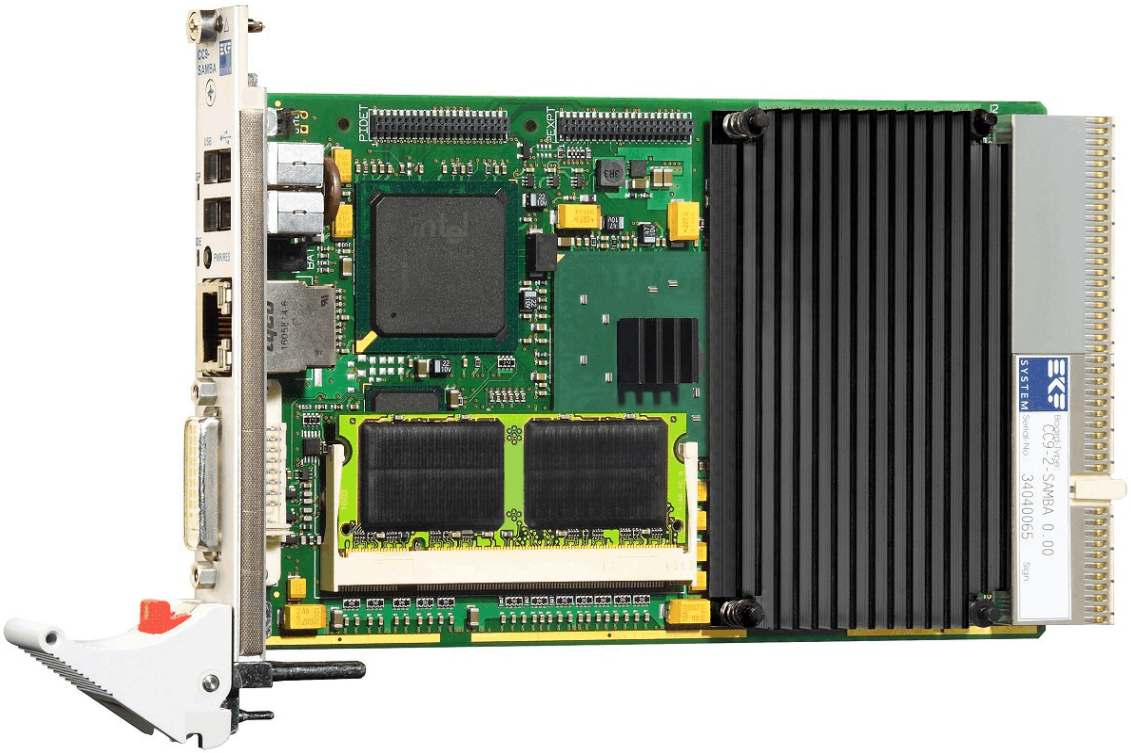
User Guide

CC9-SAMBA • *CompactPCI* ® 3U Pentium ® M CPU Board

Document No. 3439 • Edition 16

2010-05



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About this Manual

This manual describes the technical aspects of the CC9-SAMBA, required for installation and system integration. It is intended for the experienced user only.

Edition History

Ed.	Contents/*Changes*	Author	Date
1	User Manual CC9-SAMBA, english, initial edition (Text # 3439, File: cc9_uge.wpd)	gn	2004-05-05
2	Added images Modified table 'Feature Summary' Modified block diagram CC9-SAMBA Added chapter 'Expansion Module CCB-BOSSANOVA' Added chapter 'Rear I/O Module CCZ-RIO'	jj	14 September 2004
3	Modified table 'Feature Summary'	jj	18 October 2004
4	Modified table 'Microprocessor' Corrected mistake in table 'Local PCI Devices' Added values to table 'Power Supply Requirements'	jb	5 November 2004
5	Modified section 'Thermal Considerations' Reworked Table 'Feature Summary' Added support of Dothan755 processor	gn	2004-11-17
6	Added ICH4/GPIO19 functionality to table 'GPIO Usage ICH4'. Added section "Reset Jumper CMOS Values (JRTC)".	gn	2005-01-25
7	Added CC9-2-SAMBA to table 'Feature Summary'	jj	7 February 2005
8	Added ICH4/GPIO32-34 functionality to table 'GPIO Usage ICH4'.	gn	2005-02-08
9	Modified operating temperature range in table 'Feature Summary'	jj	1 March 2005
10	Added MTBF in table 'Feature Summary' Modified block Diagram (USB port number change)	jj	14 March 2005
11	Added photos CCB-BOSSANOVA	jj	25 April 2005
12	Added missing performance ratings in table 'Feature Summary'. Added SIO/GPIO13 functionality to table 'GPIO Usage SIO'.	gn	2005-05-02
13	Added Power Supply Requirements.	gn	2005-09-13
14	Removed chapter CCF-CONCERT (mature product) Added image CC9/CCB with front panel CF slot Added option VLAN support with 82541PI (table 'Feature Summary')	jj	13 November 2006
15	Added information regarding Ethernet Jumbo Frame support to table 'Feature Summary'	jj	8 February 2008
16	Changed information regarding the battery	gn	2010-05-25

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Related Documents

For information about the CCA-LAMBADA refer to the CCA Technical Information Manual, available at http://www.ekf.de/c/ccpu/cca/cca_tie.pdf.

For information about the CCB-BOSSANOVA refer to the CCB Technical Information Manual, available at http://www.ekf.de/c/ccpu/ccb/ccb_tie.pdf.

For information regarding the CCR-RIO rear I/O transition module please read the CCR Technical Information Manual, available at http://www.ekf.de/c/ccpu/cc9/ccr_tie.pdf.

For a description of the CC9-SAMBA BIOS see document 'PhonixBIOS User's Manual', available at http://www.ekf.de/c/ccpu/phxbios4r6um.pdf.

For ordering information refer to document CC9-SAMBA Product Information, available at http://www.ekf.de/c/ccpu/cc9/cc9_pie.pdf.

Nomenclature

Signal names used herein with an attached '#' designate active low lines.

Trade Marks

Some terms used herein are property of their respective owners, e.g.

Intel, Pentium, Celeron, SpeedStep: ® Intel
CompactPCI : ® PICMG
Windows 98, Windows NT, Windows 2000, Windows XP: ® Microsoft

EKF does not claim this list to be complete.

Legal Disclaimer - Liability Exclusion

This manual has been edited as carefully as possible. We apologize for any potential mistake. Information provided herein is designated exclusively to the proficient user (system integrator, engineer). EKF can accept no responsibility for any damage caused by the use of this manual.

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CC9-SAMBA Features

Feature Summary

Feature Summary CC9-SAMBA	
Form Factor	Single size *CompactPCI* style Eurocard (160x100mm^2), front panel width 4HP (20.3mm)
Processor	Designed for Intel® Pentium® M Micro FC-BGA 479 processors (0.13 Banias, 0.09 Dothan), maximum junction temperature 100°C • CC9-1: 600MHz ULV Celeron® M, 512KB L2 cache, 7W • CC9-2: 1.0GHz ULV Celeron® M (Dothan 373), 512KB L2 cache, 5W • CC9-3: 1.4GHz LV Pentium® M (Dothan 738), 2MB L2 cache, 10W • CC9-5: 1.8GHz Pentium® M (Dothan 745), 2MB L2 cache, 21W • CC5-6: 2.0GHz Pentium® M (Dothan 755), 2MB L2 cache, 21W
Chipset	Intel® i855 chipset consisting of: • 82855GME Graphics/Memory Controller Hub (GMCH) • 82801D I/O Controller Hub (ICH4) • 82802 Compatible Firmware Hub (FWH)
Memory	200-pin SO-DIMM socket (notebook style module), PC2100/2700 DDR266/333-SDRAM, 1GB maximum
Video I/O	Analog monitor and digital flat-panel display support by DVI-I connector (front panel), up to 2048x1536 pixel 16M colours @75Hz refresh rate (analog), up to 1600 x 1200 pixel 16M colours @60Hz (digital), incorporates PanelLink Digital technology (Silicon Image). • Front panel option: D-Sub (female HD15) VGA connector available, replaces DVI-I connector • Rear I/O option: Analog video across J2/P2 (CCR-RIO rear I/O transition module)
USB I/O	All ports over-current protected, data transfer rate of up to 480Mbps, conforming to USB2.0 • USB port 1: Type A connector (front panel) • USB port 2: Type A connector (front panel) • USB ports 3/4: J2/P2 Rear I/O option (CCR-RIO rear I/O transition module) • USB ports 4/6: Expansion interface option (CCA-LAMBADA/CCB-BOSSANOVA mezzanine companion board)
Ethernet I/O	• Standard 10/100/1000Mbps Gigabit Ethernet controller 82541ER, accessible via RJ45 jack from the front panel or as an option across J2/P2 with attached CCR-RIO rear I/O transition module • Jumbo Frame support up to 16KB • Option 82541PI Gigabit Ethernet controller (replaces 82541ER), Virtual LAN support, IEEE 802.1Q VLAN tag insertion and stripping and packet filtering for up to 4096 VLAN tags • Option 10/100 Ethernet (secondary LAN port), accessible via expansion connector LCI (LAN Connect Interface ICH4), requires 82562 PHY on expansion board (CCB-BOSSANOVA)
Mezzanine I/O	• On-board LPC/USB/AC97 Super-I/O, USB and audio expansion interface connector • Suitable CCA-LAMBADA/CCB-BOSSANOVA mezzanine companion boards available • On-board LCI (LAN Connect Interface) connector for an additional Ethernet port (suitable mezzanine companion board CCB-BOSSANOVA)
IDE/ATA	• Ultra ATA/100 connector (Secondary IDE), handover to CCA-LAMBADA/CCB-BOSSANOVA mezzanine expansion board with optional on-board 2.5-inch hard disk drive or external device • CompactFlash socket for a CFA ATA memory card or Microdrive® (Secondary IDE) • Option 1.8-inch on-board hard disk module (Secondary IDE), replaces CompactFlash facility • J2/P2 Rear I/O option: Primary IDE accessible from CCR-RIO rear I/O transition module CCR-RIO

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Feature Summary CC9-SAMBA

CompactPCI	32-bit PCI bridge chip PLX PCI 6150 (HB4), 133MBps CPCI master		
J2/P2 Rear I/O	• Primary IDE • GB Ethernet • USB Ports 3, 5 • VGA Analog Video • Keyboard, Mouse • COM1 (TTL Level) • Suitable rear I/O transition module CCR-RIO available		
BIOS	Phoenix BIOS		
Typical Power Requirements	Board	+3.3V +0.17V/-0.1V	
		MaxPower	WinXP Idle
	CC9-1-SAMBA		
	CC9-2-SAMBA	1.9A	1.9A
	CC9-3-SAMBA		
	CC9-5-SAMBA		
	CC9-6-SAMBA		
Thermal Conditions Environmental Conditions	• Operating temperature: -20°C ... +70°C • Storage temperature: -20°C ... +85°C • Humidity 5% ... 95% non condensing • Altitude -300m ... +3000m • Shock 15g 0.33ms, 6g 6ms • Vibration 1g 5-2000Hz		
MTBF	90 x 10^3h ~ 10 years (CC9-3 @ 50°C)		
Performance Rating Measured with PCMark2002 under Windows XP, 512MB PC2700 DDR	Board	Processor	CPU/MEM Score
	CC9-1-SAMBA	600MHz ULV Celeron® M (Banias)	1986/2645
	CC9-2-SAMBA	1GHz ULV Celeron® M (Dothan 373)	3386/3274
	CC9-3-SAMBA	1.4GHz LV Pentium® M (Dothan 738)	4745/8489
	CC9-5-SAMBA	1.8GHz Pentium® M (Dothan 745)	6143/10609
	CC9-6-SAMBA	2.0GHz Pentium® M (Dothan 755)	6773/11398

Subject to technical changes

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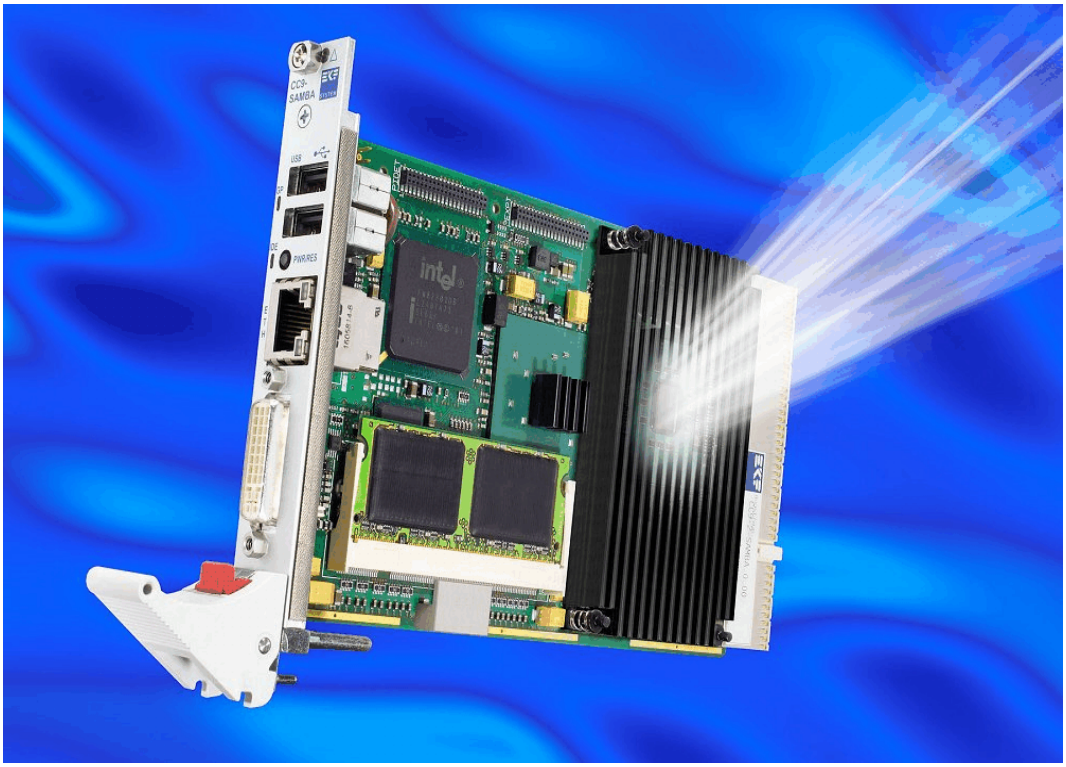
Short Description CC9-SAMBA

Alternatively equipped with the Intel® series of (LV) Pentium® M and ULV Celeron® M processors and up to 1GB RAM, the CC9-SAMBA is a versatile 4HP/3U (single size Eurocard) CompactPCI® CPU board, designed especially for systems which require low power consumption.

Available with a variety of processors, starting with the ULV 600MHz Celeron® M up to the 2.0GHz Pentium® M Dothan755, the CC9-SAMBA covers a wide range of industrial applications.

The DVI-I video interface allows for attachment of both, advanced (digital) and legacy (analog) flat panel displays and CRT monitors (D-SUB connector optionally). The CC9-SAMBA is provided with a Gigabit Ethernet controller. An on-board socket accommodates either a CompactFlash memory card or Microdrive®, or an 1.8-inch hard disk module (option). The local expansion interface connector may be used to directly attach a mezzanine companion I/O board, which can carry in addition a 2.5-inch hard disk drive. As an option, rear I/O across the J2/P2 connector is available.



CC9-SAMBA

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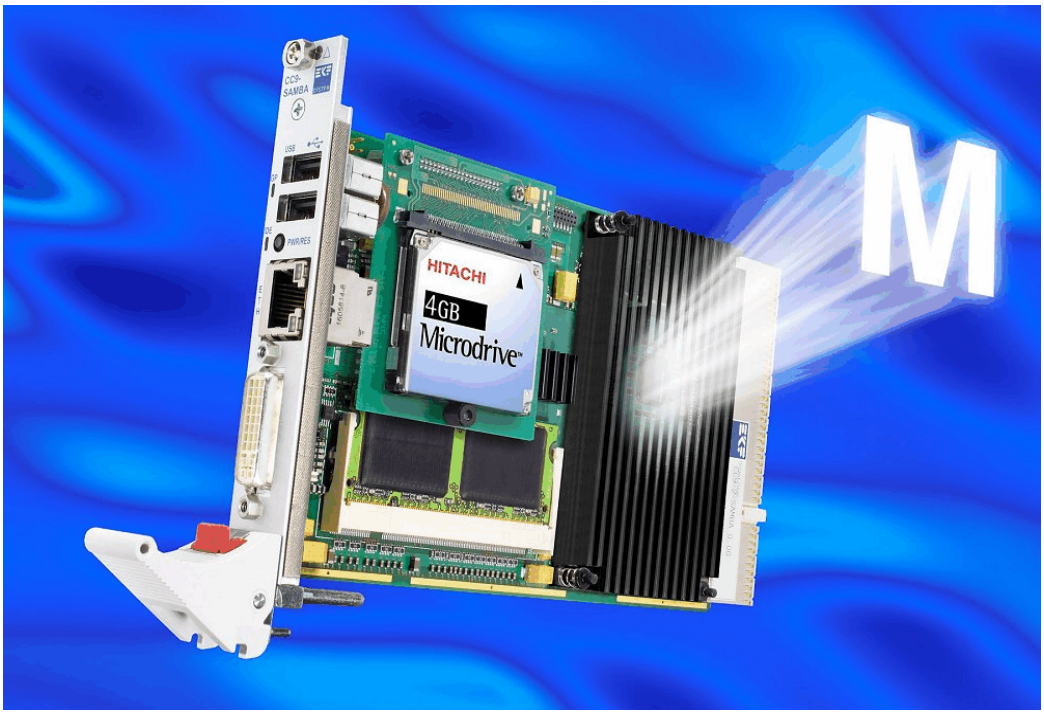
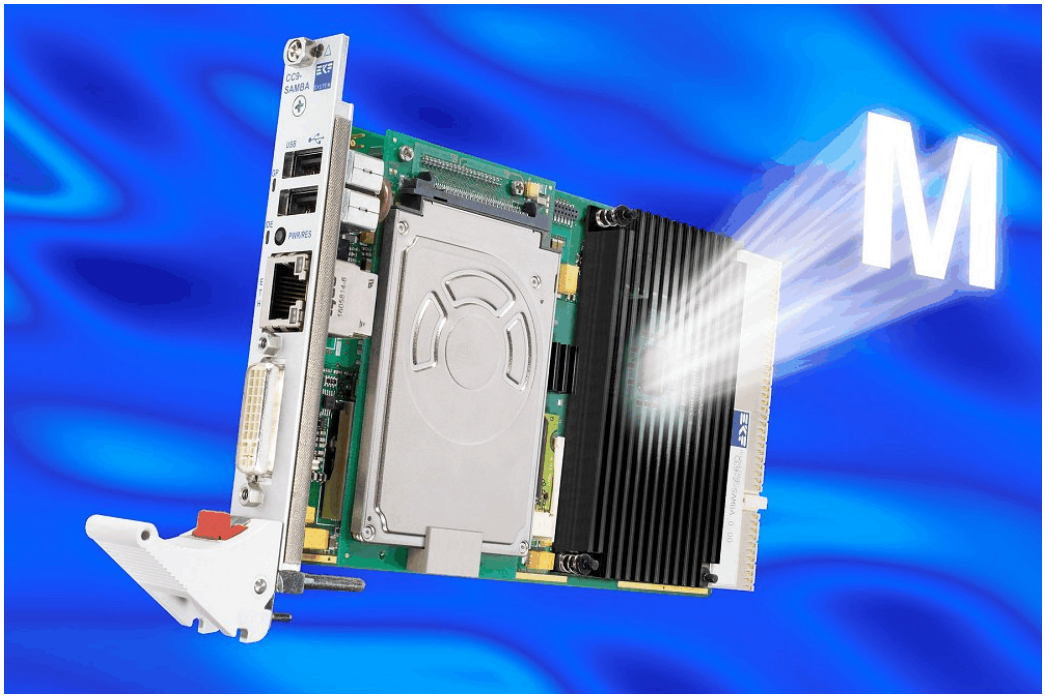


CC9-SAMBA with CF Microdrive (or CF Flash Card)



CC9-SAMBA with 1.8-Inch HD Option

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CompactFlash Adapter Module for CC9-SAMBA

The CC9-SAMBA comes with a CompactFlash adapter module, which is suitable to hold a silicon memory CF card or Microdrive hard disk. If the CC9-SAMBA is accompanied by a mezzanine expansion module such as the CCA-LAMBADA or CCB-BOSSANOVA, the position of the CompactFlash adapter module changes to the mezzanine card.

Optionally an on-board 1.8-inch hard disk module is available. When ordered, it replaces the CompactFlash adapter module (please request for a special solution which allows to use both the CF slot and the 1.8-inch drive simultaneously).

1.8-Inch on-Board Hard Disk Module for CC9-SAMBA

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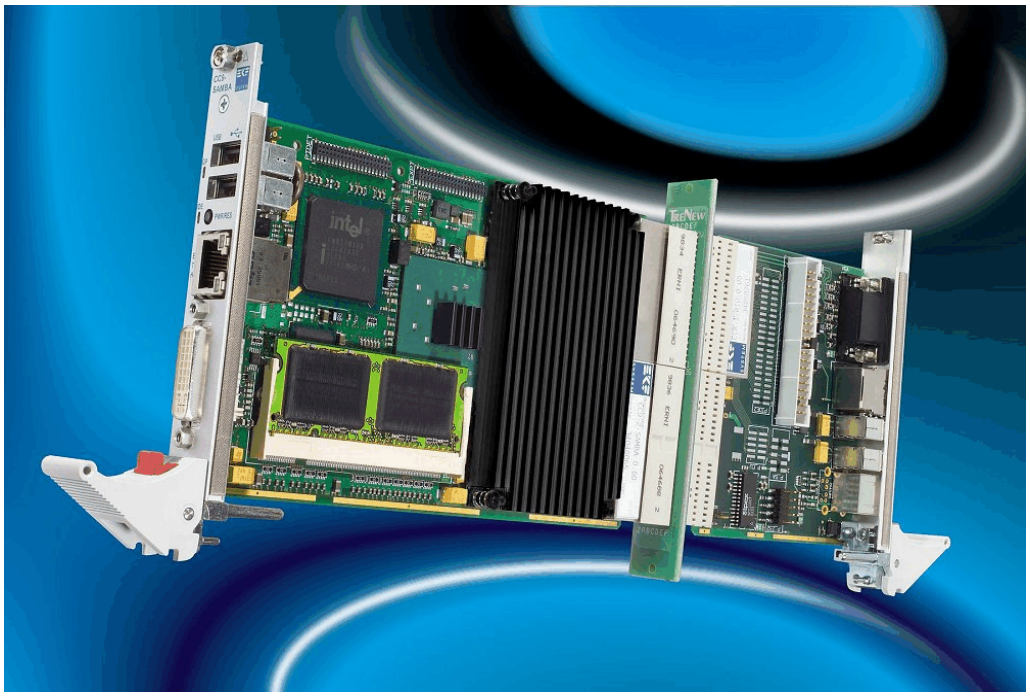
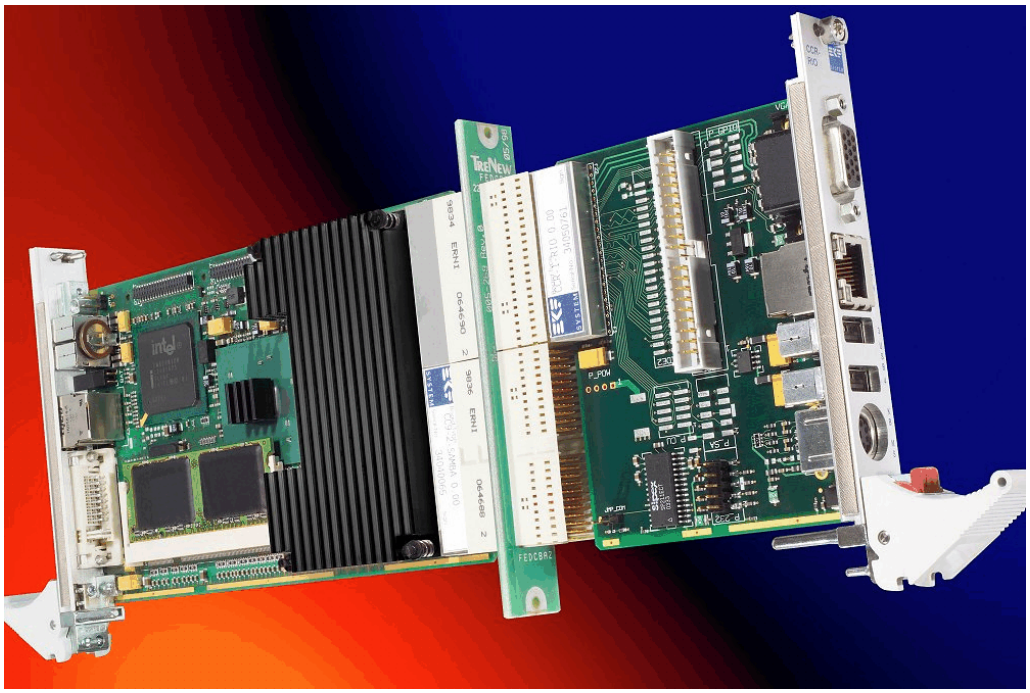


CC9-SAMBA & CCR-RIO



CC9-SAMBA & CCR-RIO

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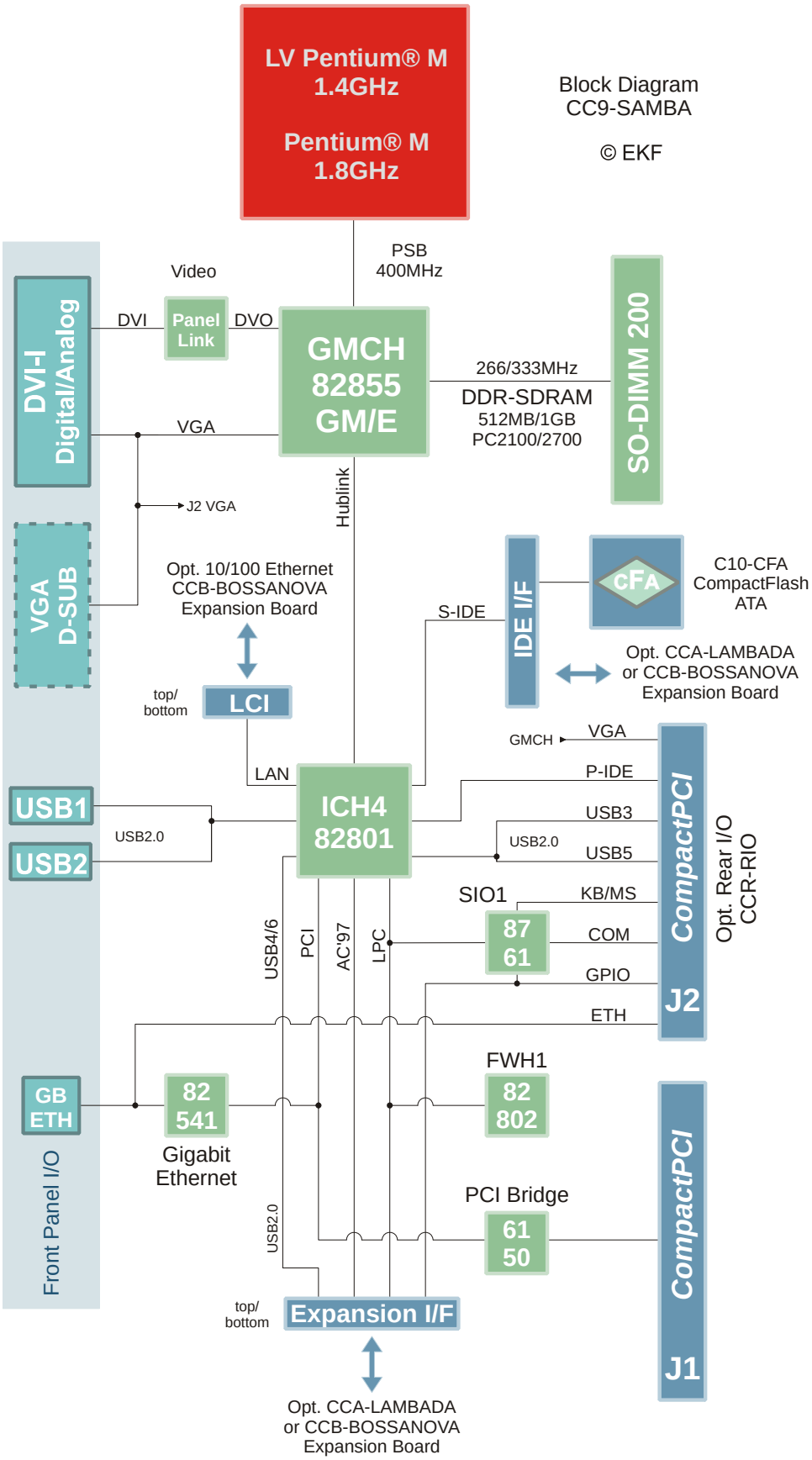
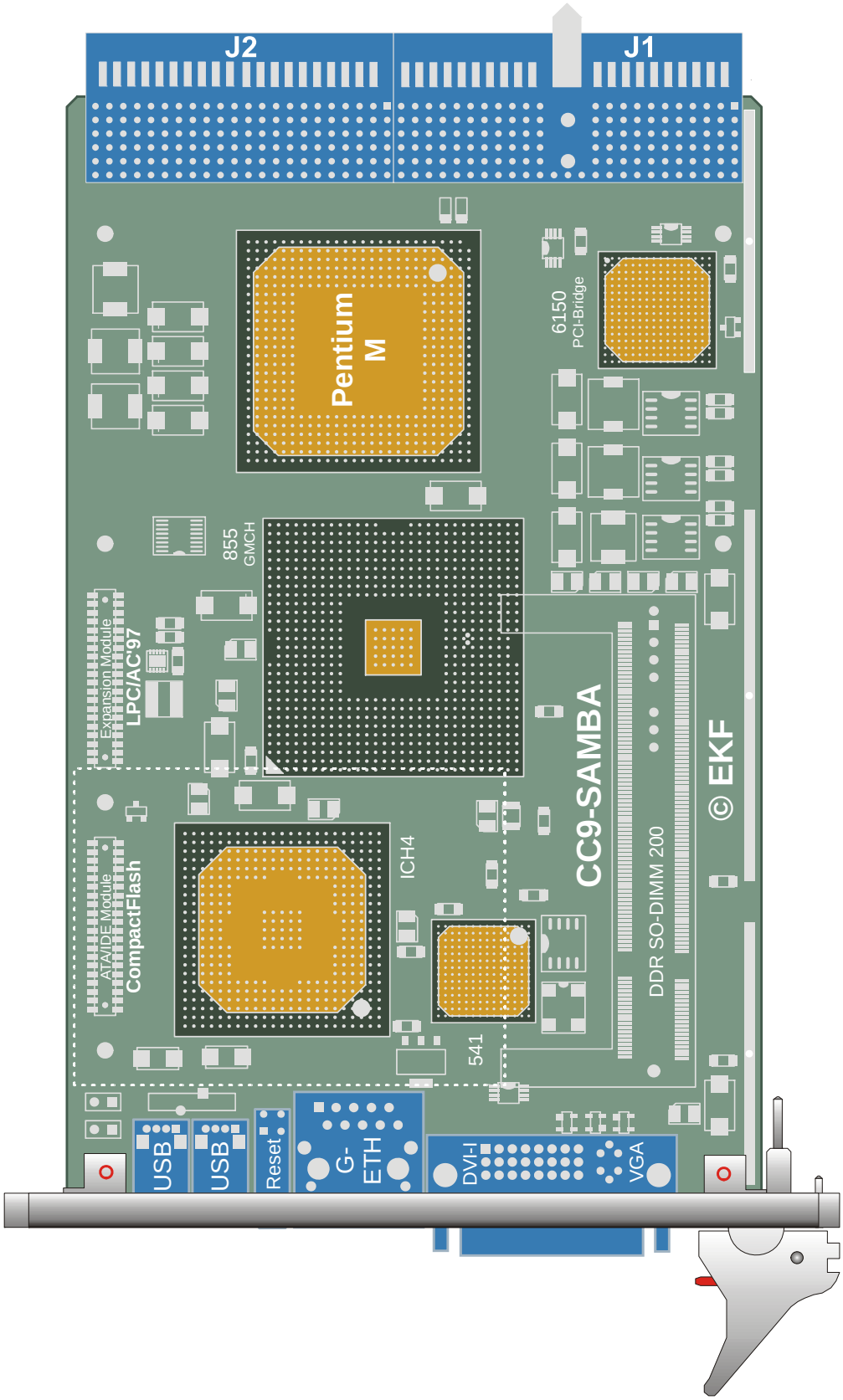
Block Diagram CC9-SAMBA



Top View Component Assembly CC9-SAMBA



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Expansion Module CCA-LAMBADA

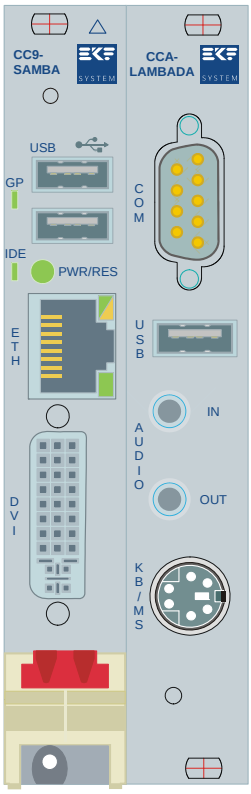
Available as a companion board to the CC9-SAMBA CPU card, the CCA-LAMBADA is provided with common legacy I/O ports. Interconnection between the CCA I/O module and the CPU carrier board is achieved by the expansion connector, which incorporates the LPC (Low Pin Count), AC'97 (audio) and USB interfaces.

As an option, the CCA-LAMBADA is available with a rugged on-board 2.5-inch or 1.8-inch hard disk drive.

The CCA-LAMBADA can be attached either left or right (bottom or top) to the CPU board, and is provided typically with a 4HP front panel.

In addition to its front panel I/O connectors, the CCA-LAMBADA has been designed also for rear I/O and therefore requires a non-bussed single-slot P1/P2 backplane in addition to the *CompactPCI* bus. However, if front panel I/O is solely needed, the J1/J2 connectors may be omitted as an option.

For technical details please refer to the 'CCA-LAMBADA Technical Information Manual', available at www.ekf.de/c/ccpu/cca/cca_tie.pdf.



CCA-LAMBADA
(Mounting on top of CC9)

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CCA-LAMBADA Mounted on Bottom of CC9-SAMBA

CCA-LAMBADA Mounted on Top of CC9-SAMBA with Hard Disk Option

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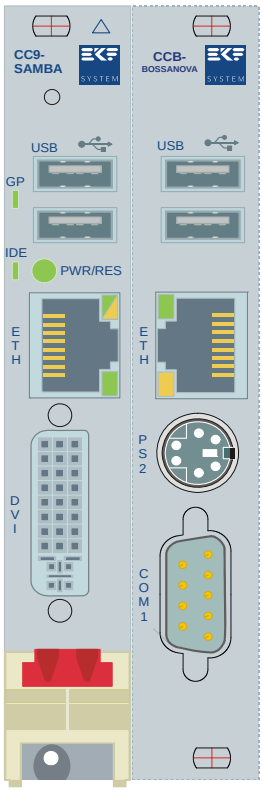
Expansion Module CCB-BOSSANOVA

The CCB-BOSSANOVA is a mezzanine companion board to the CC9-SAMBA, very similar to the CCA-LAMBADA.

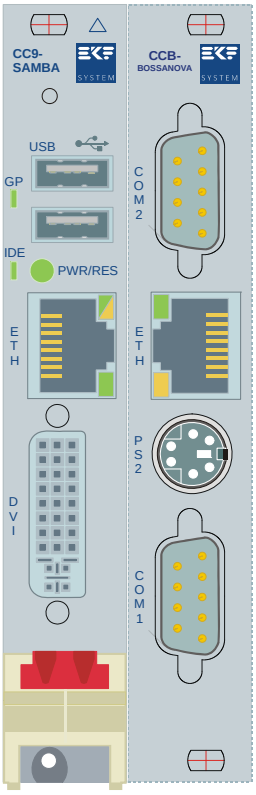
While the audio Codec has been removed, a secondary 10/100Mbps Ethernet port is available.

As the CCA-LAMBADA, the CCB-BOSSANOVA is a local expansion option, and is therefore not essential for operation of the CC9-SAMBA.

For technical details please refer to the 'CCB-BOSSANOVA Technical Information Manual', available at www.ekf.de/c/ccpu/ccb/ccb_tie.pdf.



CCB-1-BOSSANOVA
(Top Mounting on CC9)



CCB-2-BOSSANOVA
(Top Mounting on CC9)

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CCB-2-BOSSANOVA Mounted on Top of CC9-SAMBA

CCB-2-BOSSANOVA on Top of CC9-SAMBA w/o Hard Disk

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CC9-SAMBA / CCB-BOSSANOVA with front panel CF Card slot & on-board hard disk

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Rear I/O Transition Module CCR-RIO

Available as a rear I/O expansion board to the CC9-SAMBA CPU card, the CCR-RIO is provided with several I/O port connectors, to be used either in addition to the CC9 front panel connectors or alternatively. Being mainly a passive rear I/O transition module, groups of signals from the CC9-SAMBA CPU board are passed across the *CompactPCI* J2/P2 connector to the CCR-RIO. While the IDE signals are available locally on the CCR for internal attachment of ATA devices, other connectors such as USB and keyboard are mounted into the back panel for external use.

Typically the CCR-RIO ist equipped with a 4HP rear panel (20.3mm width). As an option, an 8HP panel is available with additional connectors.

Utilization of the CCR-RIO transition module adds a level of I/O functionality, which is not available with the CC9-SAMBA CPU board alone. Further on, swapping the CPU card is simplified by means of rear I/O, which is important for efficient system maintenance (MTTR).

CCR-RIO

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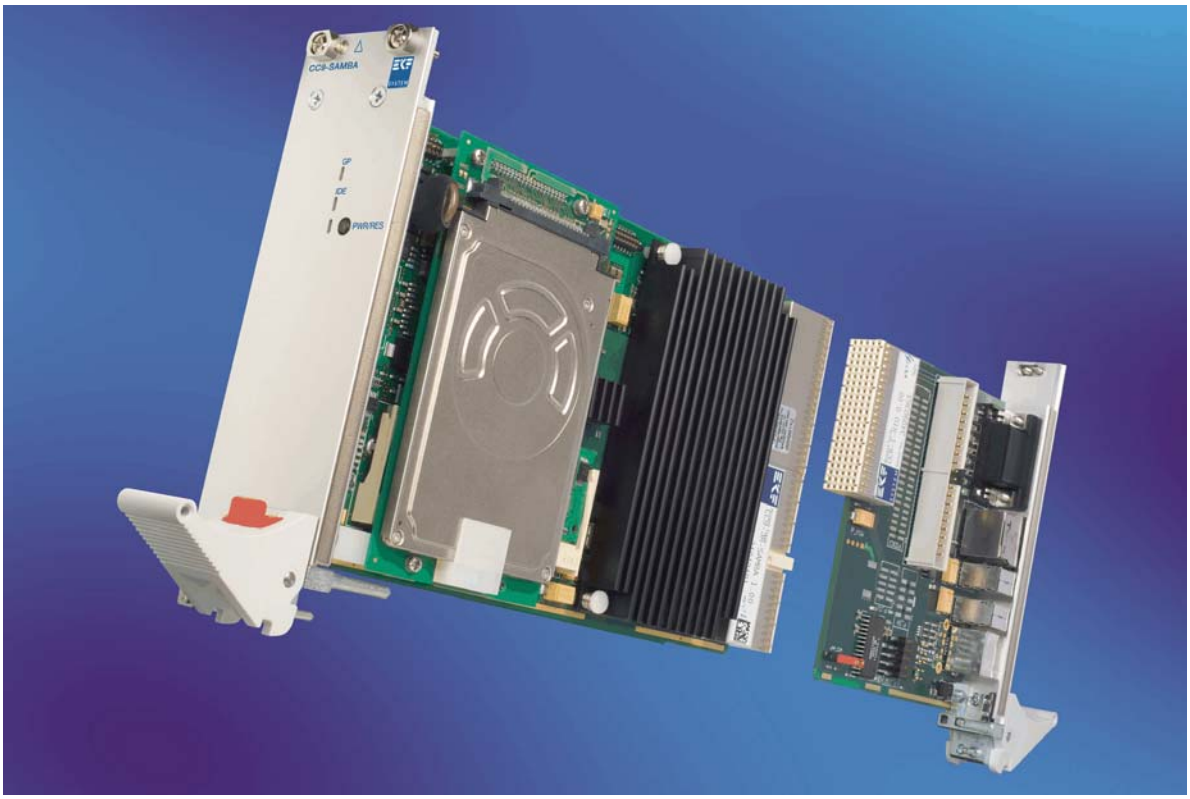
CC9-SAMBA with CF Module & CCR-RIO, Closed Front Panel for Total Rear I/O



CC9-SAMBA & Companion Board on Bottom, Closed Front Panel for Total Rear I/O

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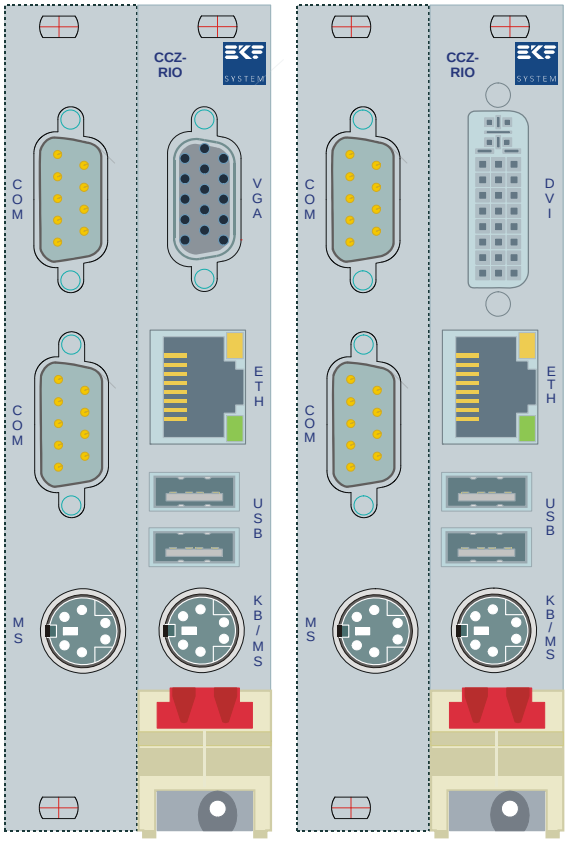
Rear I/O Transition Module CCZ-RIO

Available as an option to the mezzanine modules CCA-LAMBADA and CCB-BOSSANOVA, the rear I/O module CCZ-RIO augments the number of communication ports which are available from the systems back panel.

The CCZ-RIO may be installed in addition to the CCR-RIO, or solely. A single slot P1/P2 rear I/O backplane would be required.

For technical details please refer to the 'CCZ-RIO Technical Information Manual', available at www.ekf.de/c/ccpu/ccb/ccb_tie.pdf shortly.



CCZ-RIO 4/8HP
(VGA Video Output)

CCZ-RIO 4/8HP
(DVI-I Video Output)

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Strapping Headers

ISPCON	PLD Programming Connector, not stuffed
JRTC	Reset Jumper CMOS Values, not stuffed
JSPK	Speaker Connector

Connectors & Sockets

J1/J2	*CompactPCI* Bus 32-bit, 33/66MHz, PXI, Rear I/O
PEXPT PEXPB	Expansion Interface Connector (LPC Interface (2nd Super-I/O, 2nd FWH), USB Interfaces, AC'97 Interface, GPIOs), available either from top (T) or bottom (B) of the board
PIDET PIDEB	Ultra ATA/100 Secondary IDE Port (Interface to CompactFlash ATA Socket on C10-CFA), available either from top (T) or bottom (B) of the board
PITP	CPU Debug Port
SODIMM1	200-pin Memory Module DDR SDRAM PC2100/2700 (DDR266/333)

Front Panel Elements

Ethernet (ETH)	1000Base-TX/100Base-TX/10Base-T, RJ-45 Receptacle with integrated indicator LEDs
Graphics (DVI)	DVI-I Integrated (digital & analog) Receptacle, suitable for DVI digital flat panel displays and/or analog monitors
USB1/2	Universal Serial Bus 2.0 self powered root hub, type A receptacle
Reset (PWR/RES)	Push-button Switch with integrated indicator LED (power good)
IDE	LED indicating IDE activity
GP	General Purpose LED

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Microprocessor

The CC9-SAMBA is designed for use with Pentium® M and Celeron® M processors manufactured in 0.13µ (Banias) and 0.09µ (Dothan) technology. These includes also the Ultra Low-Voltage (ULV) Celeron® M and the Low-Voltage (LV) Pentium® M processors as listed below. The processors are housed in a Micro FC-BGA package for direct soldering to the PCB, i.e. the CPU chip cannot be removed or changed by the user.

The CC9-SAMBA supported processors are running an FSB clock of 400MHz. The internal Pentium M processor speed is achieved by multiplying the host bus frequency by a variable value. The multiplier is chosen by currently required performance and the actual core temperature. This technology is called Enhanced Intel SpeedStep®.

Power is applied across the *CompactPCI* connectors J1 (3.3V, 5V). The processor core voltage is generated by a switched voltage regulator, sourced from the 5V plane. The processor signals its required core voltage by 6 dedicated pins according to Intels IMVP-IV voltage regulator specification.

0.13µ Processors Supported (Banias)								
Processor	Speed min/max [GHz]	Host Bus [MHz]	L2 Cache [KB]	TDP [W]	Die Temp [°C]	CPU ID	Stepping	sSpec
ULV Celeron M [1) 2)]	0.6/0.6	400	512	7	0-100	0695h	B-1	SL7GE
LV Pentium M [2)]	0.6/1.1	400	1024	12.5	0-100	0695h	B-1	SL6NC
Pentium M	0.6/1.3	400	1024	22	0-100	0695h	B-1	SL6N8
Pentium M [2)]	0.6/1.6	400	1024	24.5	0-100	0695h	B-1	SL6F7
Pentium M	0.6/1.7	400	1024	24.5	0-100	0695h	B-1	SL6N9

0.09µ Processors Supported (Dothan)								
Processor	Speed min/max [GHz]	Host Bus [MHz]	L2 Cache [MB]	TDP [W]	Die Temp [°C]	CPU ID	Stepping	sSpec
ULV Celeron M 373 [1) 2)]	1.0/1.0	400	0.5	5	0-100	06D8h	C-0	SL8A4
LV Pentium M 738 [2)]	0.6/1.4	400	2	10	0-100	06D6h	B-1	SL7VC
Pentium M 745 [2)]	0.6/1.8	400	2	21	0-100	06D6h	B-1	SL7EQ
Pentium M 755	0.6/2.0	400	2	21	0-100	06D6h	B-1	SL7EL

1) This processor does not support SpeedStep® technology, thus it runs at a fixed core speed.
2) Following the Intel Embedded Roadmap, this processor is recommended for long time availability.

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Thermal Considerations

In order to avoid malfunctioning of the CC9-SAMBA, take care of appropriate cooling of the processor and system, e.g. by a cooling fan suitable to the maximum power consumption of the CPU chip actually in use. Please note, that the processors temperature is steadily measured by a special controller (MAX1617), attached to the onboard SMBus® (System Management Bus). A second sensor internal to the MAX1617 allows for acquisition of the boards surface temperature. A suitable software to display both, the die temperature as well as the board temperature, is MBM (Motherboard Monitor), which can be downloaded from the web. After installation, both temperatures can be observed permanently from the Windows taskbar.

The CC9-SAMBA is equipped with a passive heatsink. Its height takes into account the 4HP limitation in mounting space of a CPCI board. In addition, a forced vertical airflow through the system enclosure (e.g. bottom mount fan unit) is strongly recommended ($>15m^3/h$ or 200LFM around the CPU slot). As an exception, the CC9-1-SAMBA (ULV Celeron M 600MHz) can be operated with natural convection only. Be sure to thoroughly discuss your actual cooling needs with EKF. Generally, the faster the CPU speed the higher its power consumption. For higher ambient temperatures, consider increasing the forced airflow to 400 or 600LFM.

The tables showing the supported processors above give also the maximum power consumption (TDP = Thermal Design Power) of a particular processor. Fortunately, the power consumption is by far lower when executing typical Windows or Linux tasks. The heat dissipation increases when e.g. rendering software like the Acrobat Distiller is executed.

The Pentium M processors support Intel's Enhanced SpeedStep® technology. This enables dynamic switching between multiple core voltages and frequencies depending on core temperature and currently required performance. The processors are able to reduce their core speed in up to 8 steps down to 600MHz. This leads to an obvious reduction of power consumption (max. 6W @600MHz) resulting in less heating. This mode of lowering the processor core temperature is called TM2 (TM=Thermal Monitor).

Another way to reduce power consumption is to modulate the processor clock. This mode (TM1) is achieved by actuating the 'Stop Clock' input of the CPU. A throttling of 50% e.g. means a duty cycle of 50% on the stop clock input. However, while saving considerable power consumption, the data throughput of the processor is also reduced. The processor works at full speed until the core temperature reaches a critical value. Then the processor is throttled by 50%. As soon as the high temperature situation disappears the throttling will be disabled and the processors runs at full speed again.

A similar feature is embedded within the Graphics and Memory Controller (GMCH) i855GME. An on-die temperature sensor is used to protect the GMCH from exceeding its maximum junction temperature ($T_{J,max}$=110°C) by reducing the memory bandwidth.

These features are controllable by BIOS menu entries. By default the BIOS of the CC9-SAMBA enables mode TM2 which is the most efficient. The following diagram shows exemplary on a CC9-SAMBA with 1.4GHz Dothan® processor the differences between the thermal modes when the board is applied to high ambient temperatures. The performance (processor and memory scores) was measured with the benchmark 'PCMark2002' on a Windows 2000/SP4 platform (device under test was a CC9-3R-SAMBA with 512MB PC2700 DDR SDRAM, airflow approx. 500LFM).

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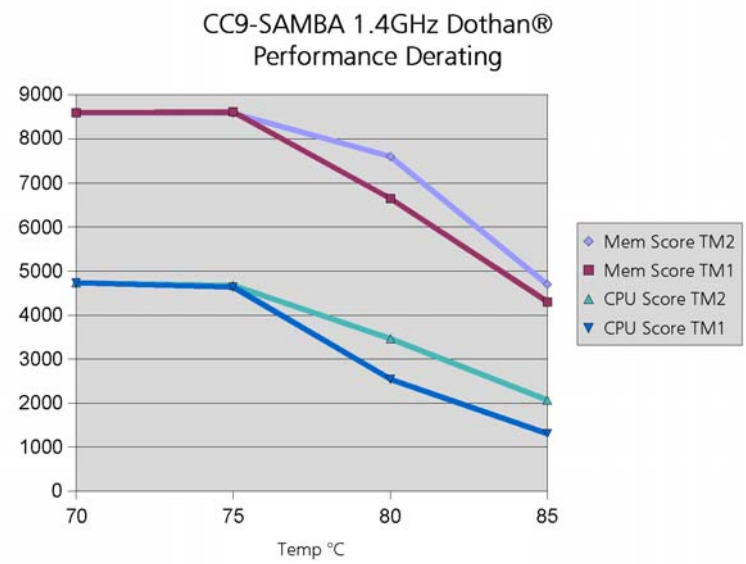

Main Memory

The CC9-SAMBA is equipped with a socket for installing a single 200-pin SO-DIMM module (module height = 1.25 inch). Supported are unbuffered SODIMMs without ECC, according the PC1600, PC2100 or PC2700 specification. Minimum memory size is 128MB; maximum memory size is 1024MB. Due to the video requirements of the i855GME chipset, a minimum of 256MB of memory is recommended for the operating systems Windows NT 4.0, Windows 2000 or Windows XP (some of the system memory is dedicated to the graphics controller). The contents of the SPD EEPROM on the SO-DIMM is used by the BIOS at POST (Power-on Self Test) to program the memory controller within the chipset.

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LAN Subsystem

The CC9-SAMBA is equipped with an 82541ER Gigabit Ethernet controller. The Intel 82541ER Gigabit Ethernet PCI LAN subsystem provides also legacy 10Base-T and 100Base-TX connectivity. Features include:

- PCI bus mastering 32-bit, 33MHz
- 1000Base-Tx (Gigabit Ethernet), 100Base-TX (Fast Ethernet, half- or full-duplex) and 10Base-T (Classic Ethernet) capability using a single RJ-45 connector
- IEEE 802.3 Auto-Negotiation for the fastest available connection
- Jumperless configuration (complete software-configurable)

Available as an option, the CC9-SAMBA can be equipped with the 82541PI Gigabit Ethernet controller, which replaces the 82541ER. The 82541PI silicon supports in addition Virtual LANs by IEEE 802.1Q VLAN tag insertion and stripping and packet filtering for up to 4096 VLAN tags.

Two bicoloured display LEDs integrated into the RJ-45 connector signal the LAN link, the LAN connection speed and activity status.

The NIC (Networking Interface Controller) resides on the local PCI bus. Its MAC address (unique hardware number) is stored in an EEPROM. The Intel Ethernet software and drivers for the 82541ER is available from Intel's World Wide Web site for download.

Please note that a secondary 10/100Mbps Ethernet port is available across the LCI (LAN connect interface) expansion connector. A suitable mezzanine card with the 82562 LCI PHY is the CCB-BOSSANOVA.

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Enhanced IDE Interface

The EIDE interface handles the exchange of information between the processor and peripheral devices like hard disks, ATA CompactFlash cards and CD-ROM drives. The interface supports:

- Up to four ATA devices (including one CompactFlash slot)
- PIO Mode 3/4, Ultra ATA/33, Ultra ATA/66, Ultra ATA/100
- Support for LS-120 drives

The primary IDE interface is routed to the *CompactPCI* J2 connector. The rear I/O adapter CCR-RIO allows the connection of a master and a slave IDE device via a standard 40-pin flat ribbon cable (use special 80-pin cabling assembly for Ultra ATA/66 or /100 operation).

The presence of an 80-pin cable at the primary IDE interface could be checked out by reading the state of the GPI8 of the I/O Controller Hub (ICH4). A logical 1 signals a 40-pin, a logical 0 a 80-pin cable. See the ATA/ATAPI-6 specification (section 6.7 “Host determination of cable type by detecting CBLID-“) for details.

The secondary IDE interface is routed to the on-board connectors PIDET and PIDEB (T:top side, B:bottom side of the board). PIDE is used to interface to the CompactFlash Card adapter C10-CFA or to the expansion board CCA-LAMBADA. Use the C10-CFA adapter to attach a CompactFlash ATA style silicon disk, whenever a hard disk is not suitable for your system, or as an additional mass storage device. The CCA-LAMBADA expansion board is capable to carry an on-board 1.8" or 2.5" hard disk drive. When using the 1.8" option the concurrent operation of a CompactFlash device is possible.

A display LED, situated in the front panel near the reset push-button, signals disk activity status of the primary and also the secondary IDE devices.

The IDE controller is integrated into the ICH4. Ultra ATA IDE drivers can be downloaded from the Intel website.

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Graphics Subsystem

The graphics subsystem is part of the Intel i855GME Graphics/Memory Controller Hub (GMCH). The CC9-SAMBA is provided with the DVI-I graphics connector. This is both a digital and analog interface. Recent digital input flat-panel displays are widely available with this connector style. For classic monitors, adapters or adapter cables can be used for converting from DVI-I to the 15-pin HD D-SUB connector.

A special display transmitter chip is used for serializing/deserializing the differential DVI signals. The SiI 164 (Silicon Image) transmitter uses PanelLink® Digital technology to support displays ranging from VGA to UXGA resolutions (25 - 165Mpps) in a single link interface.

The GMCH supports several video resolutions and refresh rates. A partial list is contained in the table below. Please note, that flat-panel displays should be operated with their maximum resolution at 60Hz refresh rate.

Partial List of i855GME GMCH Video Modes (analog / digital)					
Resolution	60Hz	70Hz	72Hz	75Hz	85Hz
640x480	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
800x600	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
1024x768	✓ / ✓[1)]	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
1280x1024	✓ / ✓[1)]	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
1600x1200	✓ / ✓[1)]	✓ / -	✓ / -	✓ / -	✓ / -
2048x1536	✓ / -	✓ / -	✓ / -	✓ / -	- / -

[1)] This video mode is suitable for popular flat-panel displays.

As an option, the CC9-SAMBA can be equipped with an ordinary HD D-Sub 15-lead connector (VGA style). This connector is suitable for analog signals only, so the PanelLink transmitter is not stuffed with this option. Nevertheless also flat-panel displays can be attached to the D-Sub connector with only minor impact on the image quality.

Independent from the video connector actually in use, DVI or VGA, the VESA DDC 2B standard is supported. This is a two-wire serial bus (clock, data), which is controlled by the GMCH and allows to read out important parameters, e.g. the maximum allowable resolution, from the attached monitor. In addition, DDC Power (+5V) is delivered to either connector. A resettable fuse is stuffed to protect the board from an external short-circuit condition (0.75A).

Graphics drivers for the i855GME can be downloaded from the Intel website.

Real-Time Clock

The CC9-SAMBA has a time-of-day clock and 100-year calendar, integrated into the ICH4. A battery on the board keeps the clock current when the computer is turned off. The CC9 uses a Vanadium-Pentoxide-Lithium rechargeable battery, giving an autonomy of more than 80 days when fully loaded after 24 hours. The cell is free of memory effects and withstands deep discharging.

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Universal Serial Bus (USB)

The CC9-SAMBA is provided with six USB ports, all of them are USB 2.0 capable. Two USB interfaces are routed to front panel connectors, two ports are feed to the expansion board interface connectors PEXP, and two further ports are optionally available for rear I/O across the J2/P2 *CompactPCI* connector.

The front panel USB connectors can source up to 0.5A/5V each, over-current protected by two electronic switches. Protection for the USB ports on the expansion interface and on the rear I/O connector is located on the CCA-LAMBADA and the CCR-RIO respective. The USB controllers are integrated into the ICH4.

LPC Super-I/O Interface

In a modern system, legacy ports as PS/2 keyboard/mouse, COM1/2 and LPT have been replaced by USB and Ethernet connectivity. The 1.4MB floppy disk drive has been swapped against LS-120 or CD-RW drives, attached to the IDE connector, or USB memory sticks. Hence, the CC9-SAMBA is virtually provided with all necessary I/O ports. However, for compatibility purposes the CC9 is additionally equipped with a simple Super-I/O chip, for optional rear I/O of PS/2 keyboard/mouse and COM1 (TTL level only) across the J2/P2 CPCI connector. The Super-I/O controller resides on the local LPC bus (LPC = Low Pin Count interface standard), which is a serialized ISA bus replacement.

As an alternative, EKF offers the CCA-LAMBADA, an expansion module to the CC9-SAMBA, featuring all classic Super-I/O functionality. The CCA-LAMBADA is a 3U Eurocard with a 4HP (single) width front panel. Access to the connectors PS/2 (mouse, keyboard), COM, USB and audio in/out is given directly from the front panel. The CCA-LAMBADA connects to the CC9-SAMBA across the connector PEXPT or PEXPB. The CCA-LAMBADA can be attached either to the top or to the bottom of the CC9-SAMBA.

Watchdog/Reset

The CC9-SAMBA is provided with two MAX6705 supervisor circuits, which monitor the supply voltages 2.5V, 3.3V and 5V, and generate a power-on reset signal. The manual push-button reset is also passed through the MAX6705s for appropriate pulse conditioning.

The reset manual push-button is situated at the front panel. The button is indent mounted behind the front and requires a tool, e.g. pen to be pressed, preventing from being inadvertently activated. The push button reset signal is routed across a PLD (programmable logic device) and could be passivated on customers request.

The healthy state of the CC9-SAMBA is signalled by the LED PWR integrated into the reset push-button. As soon as this LED begins to shine all power voltages are well and the reset signal has been deasserted.

Another feature is the watchdog function, which can be programmed by software. The behaviour of the MAX6705 watchdog is partially defined by the PLD, which controls whether the watchdog is activated. The related software (e.g. BIOS, application program) must trigger the watchdog by toggling the GPO21 signal of the ICH4.

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The watchdog is in a passive state after a system reset. There is no need to trigger it at boot time. Once the GPO21 of the ICH4 has sent a pulse, the watchdog is activated. If the duration between two trigger pulses exceeds a period of 1000ms, the watchdog times out and a system reset will be generated. The watchdog remains in the active state until the next system reset. There is no way to disable it once it was started.

Firmware Hub (Flash BIOS)

The BIOS is stored in an 82802 8Mbit Firmware Hub (there are second sources in use with deviant part numbers). The firmware hub contains a nonvolatile memory core based on flash technology, allowing the BIOS to be upgraded.

The FWH can be reprogrammed (if suitable) by a DOS based tool. This program and the latest CC9-SAMBA BIOS are available from the EKF website. Read carefully the enclosed instructions. If the programming procedure fails e.g. caused by a power interruption, the CC9-SAMBA may no more be operable. In this case you would have to send in the board, because the BIOS is directly soldered to the PCB and cannot be changed by the user.

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PWR (Board Healthy) LED

The CC9-SAMBA offers a software programmable LED located in the reset push-button. After system reset, this LED defaults to signal the board healthy. By the first setting of the GPO20 of the ICH4 this LED changes its function and is then controlled only by the level of the GPO20 pin. Setting this pin to 1 will switch on the LED. The PWR LED remains in the programmable state until the next system reset.

IDE (Hard Disk Activity) LED

The CC9-SAMBA offers a LED, marked as IDE (placed near the reset push-button). This LED signals activity on any of the IDE ports.

GP (General Purpose) LED

A second, programmable LED can be also observed from the front panel. The status of the GP LED is controlled by the GPO18 output of the ICH4. Setting this pin to 1 will switch on the LED. As of current, the GP LED is not dedicated to any particular hardware or firmware function (this may change in the future).

Hot Swap Detection

The *CompactPCI* specification added the signal ENUM# to the PCI bus to allow the system hot swapping. This signal is routed to the GPI0 of the ICH4 on the CC9-SAMBA. A System Management Interrupt (SMI) can be requested if ENUM# changes by insertion or removal of a board.

Note that the CC9-SAMBA itself is not a hot swap device, because it makes no sense to remove the system controller from a *CompactPCI* system. However, it is capable to recognize the hot swap of peripheral boards and to start software that is doing any necessary system reconfiguration.

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Power Supply Status (DEG#, FAL#)

Power supply failures may be detected before the system crashes down by monitoring the signals DEG# or FAL#. These active low lines are additions of the *CompactPCI* specification and may be driven by the power supply. DEG# signals the degrading of the supply voltages, FAL# there possible failure. On the CC9-SAMBA FAL# is routed to the GPI6 and DEG# to the GPI7 of the ICH4.

PXI Trigger Signals

As an option, the CC9-SAMBA supports four of the eight trigger signals of the PXI standard, as defined by National Instruments. The trigger signals are provided by the local SIO (Super-I/O) chip IT8761E. GPIO20/21 are routed to TRIG0/1, and GPIO26/27 are used to control TRIG6/7. These signals can also be used as GPIO lines in a non-PXI environment.

Local GPIO Option

In addition to the GPIO / PXI-Trigger lines optionally available on J2, the expansion connector PEXP provides another two GPIO lines available for user specific application. The 5V TTL signals sio_gpio16/17 are controlled by the on-board SIO IT8761E, with an internal 50kΩ PU resistor and capable of sinking 24mA each.

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Rear I/O Options

Optionally, the CC9-SAMBA can be used for rear I/O with respect to the following functions:

- Analog Graphics
- Gigabit Ethernet
- Primary IDE
- 2 USB Ports
- Keyboard, Mouse
- COM1 (TTL Level)

The analog graphics and the gigabit ethernet signals are routed to multiplexers on the CC9-SAMBA. These switches, controlled by BIOS, select either the front panel or the rear I/O connection. Keyboard and mouse as well as the serial interface require the on-board SIO to be stuffed. The COM1 port does not include the physical transceiver (TTL level only). This transceiver is located on the rear I/O module CCR-RIO instead. Each of the above functions can be activated individually (by appropriate stuffing/removing of resistor networks).

The CC9 CPU card by default is suitable for a 64-bit *CompactPCI* backplane. However, the J2/P2 pin assignments of a 64-bit CPCI backplane differ substantially from a *CompactPCI* rear I/O backplane. Hence usage of the rear I/O features is available only as stuffing options on the CC9 CPU board, which have to be ordered explicitly.

The system in use must be equipped with a P2 *CompactPCI* rear I/O backplane. If the system is provided with a P2 *CompactPCI* 64-bit backplane instead, several of the CC9 rear I/O signals will collide with the 64-bit address/data lines on the backplane, with unpredictable results regarding the rear I/O signal integrity.

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Installing and Replacing Components

Before You Begin

Warnings

The procedures in this chapter assume familiarity with the general terminology associated with industrial electronics and with safety practices and regulatory compliance required for using and modifying electronic equipment. Disconnect the system from its power source and from any telecommunication links, networks or modems before performing any of the procedures described in this chapter. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage. Some parts of the system can continue to operate even though the power switch is in its off state.

Caution

Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis or board front panel. Store the board only in its original ESD protected packaging. Retain the original packaging (antistatic bag and antistatic box) in case of returning the board to EKF for rapair.

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Installing the Board

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

- Switch off the system, remove the AC power cord
- Attach your antistatic wrist strap to a metallic part of the system

- Remove the board packaging, be sure to touch the board only at the front panel
- Identify the related *CompactPCI* slot (peripheral slot for I/O boards, system slot for CPU boards, with the system slot typically most right or most left to the backplane)
- Insert card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighboured front panels)
- A card with onboard connectors requires attachment of associated cabling now
- Lock the ejector lever, fix screws at the front panel (top/bottom)
- Retain original packaging in case of return

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Removing the Board

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

- Switch off the system, remove the AC power cord
- Attach your antistatic wrist strap to a metallic part of the system
- Identify the board, be sure to touch the board only at the front panel
- unfasten both front panel screws (top/bottom), unlock the ejector lever
- Remove any onboard cabling assembly
- Activate the ejector lever
- Remove the card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighboured front panels)
- Store board in the original packaging, do not touch any components, hold the board at the front panel only

Warning

Do not expose the card to fire. Battery cells and other components could explode and cause personal injury.

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EMC Recommendations

CE

In order to comply with the CE regulations for EMC, it is mandatory to observe the following rules:

- The chassis or rack including other boards in use must comply entirely with CE
- Close all board slots not in use with a blind front panel
- Front panels must be fastened by built-in screws
- Cover any unused front panel mounted connector with a shielding cap
- External communications cable assemblies must be shielded (shield connected only at one end of the cable)
- Use ferrite beads for cabling wherever appropriate
- Some connectors may require additional isolating parts

Reccomended Accessories

Blind CPCI Front Panels	EKF Elektronik	Widths currently available (1HP=5.08mm): with handle 4HP/8HP without handle 2HP/4HP/8HP/10HP/12HP
Ferrit Bead Filters	ARP Datacom, 63115 Dietzenbach	Ordering No. 102 820 (cable diameter 6.5mm) 102 821 (cable diameter 10.0mm) 102 822 (cable diameter 13.0mm)
Metal Shielding Caps	Conec-Polytronic, 59557 Lippstadt	Ordering No. CDFA 09 165 X 13129 X (DB9) CDSFA 15 165 X 12979 X (DB15) CDSFA 25 165 X 12989 X (DB25)

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Installing or Replacing the Memory Module

Note: If you decide to replace the memory, observe the precautions in 'Before You Begin'

By default, the CC9-SAMBA comes fully equipped and tested with a DDR SD-RAM memory module. So normally there should be no need to install a memory module.

The CC9-SAMBA requires a PC1600/2100/2700 (200/266/333MHz) DDR SDRAM SO-DIMM module. It is highly recommended that Serial Presence Detect (SPD) SO-DIMMs be used, since this allows the chipset to accurately configure the memory settings for optimum performance. If non-SPD memory is installed, the BIOS will attempt to correctly configure the memory settings, but performance and reliability may be impacted.

A replacement memory module must match the 200-pin SO-DIMM form factor (known from Notebook PCs), 2.5V, 200/266/333MHz, unbuffered, non-ECC style. Suitable modules are available up to 1GB. The i855GME supports modules of up to a maximum of 13 address lines (A0...A12). Memory modules organized by more than13 address lines are not suitable.

Replacement of the Battery

When your system is turned off, a battery maintains the voltage to run the time-of-day clock and to keep the values in the CMOS RAM. The rechargeable battery is soldered to the CC9-SAMBA. For replacement, the old battery must be desoldered, and the new one soldered. We suggest that you send back the board to EKF for battery replacement.

Warning

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type. Do not expose a battery to fire.

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Technical Reference

Local PCI Devices

The following table shows the on-board PCI devices and their location within the PCI configuration space. These devices consist of the Ethernet controller, the PCI-To-PCI Bridge and several devices within the i855GME chip set.

Bus Number	Device Number	Function Number	Vendor ID	Device ID	Description
0	0	0	0x8086	0x3580	Host Bridge
0	0	1	0x8086	0x3584	Main Memory Controller
0	0	3	0x8086	0x3585	GMCH Config. Registers
0	2	0	0x8086	0x3582	Integrated Graphics Device
0	29	0	0x8086	0x24C2	USB UHCI Controller #1
0	29	1	0x8086	0x24C4	USB UHCI Controller #2
0	29	2	0x8086	0x24C7	USB UHCI Controller #3
0	29	7	0x8086	0x24CD	USB 2.0 EHCI Controller
0	30	0	0x8086	0x244E	Hub Interface Bridge
0	31	0	0x8086	0x24C0	LPC Bridge
0	31	1	0x8086	0x24CB	IDE Controller
0	31	3	0x8086	0x24C3	SMB Controller
0	31	5	0x8086	0x24C5	AC'97 Audio Controller
0	31	6	0x8086	0x24C6	AC'97 Modem Controller
2 [1)]	1	0	0x8086	0x1078	Ethernet Controller
2 [1)]	4	0	0x3388	0x0022	PCI-To-PCI Bridge (CPCI)

[1)] This bus number can vary depending on the PCI enumeration schema implemented in BIOS.

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Local SMB Devices

The CC9-SAMBA contains a few devices that are reachable via the System Management Bus (SMB). These are the clock generation chip, the SPD EEPROM on the SO-DIMM memory module and a CPU temperature controlling device in particular. Other devices could be connected to the SMB via the *CompactPCI* signals IPMB SCL (J1 B17) and IPMB SDA (J1 C17).

Address	Description
0x30	CPU Temperature Sensor MAX 1617
0xA0	SPD of SO-DIMM
0xD2	Main Clock Generation (CK-408)

GPIO Usage

GPIO Usage ICH4

CC9-SAMBA GPIO Usage ICH4				
Function	GPIO	Type	Tol.	Origin/Destination
CPCI_ENUM#	GPI 0	I	5V	CPCI Hot Swap Mgmt.
CPCI_INTP	GPI 1	I	5V	CPCI INTP Line
PCI_IRQE#	GPI 2	I	5V	CPCI INTP Line
PCI_IRQF#	GPI 3	I	5V	CPCI INTC#
PCI_IRQG#	GPI 4	I	5V	CPCI INTD#
PCI_IRQH#	GPI 5	I	5V	ICH4 USB 2.0 Controller
CPCI_FAL#	GPI 6	I	5V	CPCI Power Mgmt.
CPCI_DEG#	GPI 7	I	5V	CPCI Power Mgmt.
IDEP_CBLID#	GPI 8	I	3.3V	IDE Primary Cable ID Line
-	INTRUDER#	I	3.3V	-
IDES_CBLID#	GPI 11	I	3.3V	IDE Secondary Cable ID Line
EXP_PME#	GPI 12	I	3.3V	Expansion Interface PME# Line
EXP_SMI#	GPI 13	I	3.3V	Expansion Interface SMI# Line
-	GPO 16	O	3.3V	-
-	GPO 17	O	3.3V	-
ICH_GPO18	GPO 18	O	3.3V	PLD (GP LED Control)
RTCRST# [1)]	GPO 19	O	3.3V	ICH4 (RTCRST# Input)
ICH_GPO20	GPO 20	O	3.3V	PLD (PWR LED Control)

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CC9-SAMBA GPIO Usage ICH4				
Function	GPIO	Type	Tol.	Origin/Destination
WDOG_TRG#	GPO 21	O	3.3V	PLD (HW Watchdog Trigger)
-	GPO 22	OD	3.3V	-
-	GPO 23	O	3.3V	-
SMB_CPCI_EN	GPIO 24	I/O	3.3V	Connect CPCI IPMB to local SMBus LOW: IPMB disconnected from SMBus HIGH: IPMB connected to SMBus
-	GPIO 25	I/O	3.3V	-
VGA_SWITCH	GPIO 27	I/O	3.3V	VGA Switching Line: LOW: VGA via Rear I/O HIGH: VGA via Front I/O
ETH_SWITCH	GPIO 28	I/O	3.3V	Ethernet Switching Line: LOW: Ethernet via Rear I/O HIGH: Ethernet via Front I/O
BOARD_CFG [1)]	GPIO 32-34	I	3.3V	Board Configuration Jumpers
-	GPIO 35-43	I/O	3.3V	-

[1)] Feature available as of revision 2.

GPIO Usage FWH

CC9-SAMBA GPIO Usage FWH				
Function	GPIO	Type	Tol.	Origin/Destination
FWH_ID	GPI 0	I	3.3V	FWH Identity: Hardwired to LOW (indicates FWH #1)
-	GPI 1	I	3.3V	-
WDOGRST	GPI 2	I	3.3V	PLD (Last HW Reset caused by watchdog)
MSB PCB REV	GPI 3	I	3.3V	GPI 3 GPI 4 Rev. 0 0 0 0 1 1 1 0 2 1 1 3+
LSB PCB REV	GPI 4	I	3.3V	

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GPIO Usage SIO

CC9-SAMBA GPIO Usage SIO				
Function	GPIO	Type	Tol.	Origin/Destination
CPCI_64EN# [1)]	GPIO 13	I	5V int. PU	*CompactPCI* 64EN# J2/P2
-	GPIO 14/15	I/O	5V int. PU 8mA	-
SIO_GPIO16	GPIO 16	I/O	5V int. PU 24mA	Expansion Interface GPIO
SIO_GPIO17	GPIO 17	I/O	5V int. PU 24mA	Expansion Interface GPIO
PXI_TRIG0	GPIO 20	I/O	5V int. PU 8mA	PXI Trigger 0 J2/P2
PXI_TRIG1	GPIO 21	I/O	5V int. PU 8mA	PXI Trigger 1 J2/P2
-	GPIO 22-25	I/O	5V int. PU 24mA	-
PXI_TRIG6	GPIO 26	I/O	5V int. PU 24mA	PXI Trigger 6 J2/P2
PXI_TRIG7	GPIO 27	I/O	5V int. PU 24mA	PXI Trigger 7 J2/P2

[1)] Feature available as of revision 3.

GPIO Usage PCI Bridge

CC9-SAMBA GPIO Usage PCI-PCI Brigde				
Function	GPIO	Type	Tol.	Origin/Destination
-	GPIO 0	I/O	3.3V	-
-	GPIO 1	I/O	3.3V	-
EN_INTS_SI	GPIO 2	I/O	3.3V	Connect CPCI INTS Line to local SERIRQ LOW: INTS disconnected from SERIRQ HIGH: INTS connected to SERIRQ
CPCI_SYSEN#	GPIO 3	I/O	3.3V	CPCI SYSEN# Line

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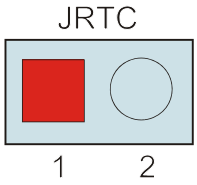
Configuration Jumpers

Reset Jumper CMOS Values (JRTC)

The jumper JRTC is used to bring the contents of the battery backed CMOS RAM to a default state. The BIOS uses the CMOS to store configuration values, e.g. the actual boot devices.

To reset the CMOS RAM the board must be removed from the system rack. Short-circuit the pins of JRTC for about 1 sec. After that reinstall the board to the system and switch on the power. It is important to accomplish the CMOS reset while the board has no power.



JRTC	Function
Jumper OFF [1)]	No CMOS reset performed
Jumper ON	CMOS reset performed

Note:
[1)] This setting is the factory default.

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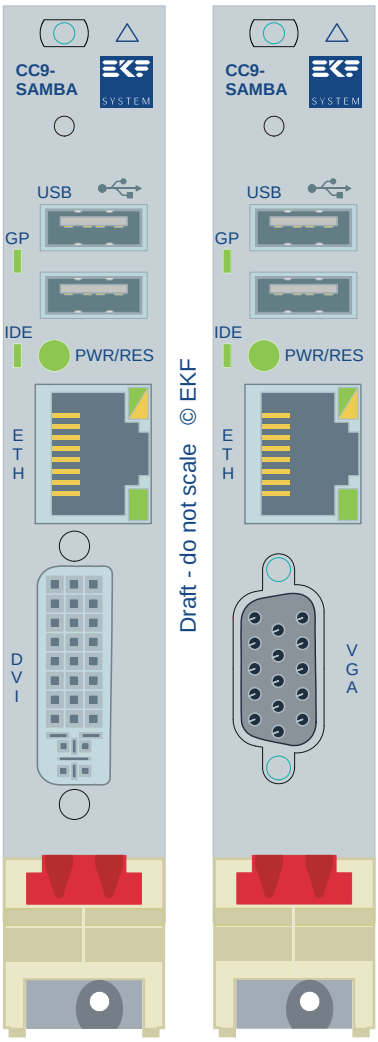
Connectors

Caution

Some of the internal connectors provide operating voltage (3.3V and 5V) to devices inside the system chassis, such as internal peripherals. Not all of these connectors are overcurrent protected. Do not use these internal connectors for powering devices external to the computer chassis. A fault in the load presented by the external devices could cause damage to the board, the interconnecting cable and the external devices themselves.

Front Panel Connectors



CC9-SAMBA Front Panel Elements

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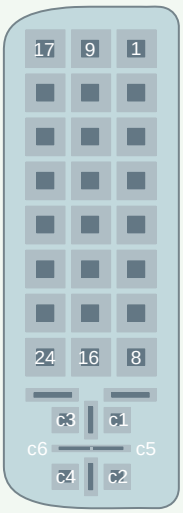
Video Monitor Connector DVI-I



DVI-I					
17	TX0-	9	TX1-	1	TX2-
18	TX0+	10	TX1+	2	TX2+
19	GND	11	GND	3	GND
20		12		4	
21		13		5	
22	GND	14	DDC_POW [1]	6	DDC_SCL
23	TXC+	15	GND	7	DDC_SDA
24	TXC-	16	DVI_HP	8	VSYNC

c3	BLUE	c1	RED	
c6	GND	c5	GND	
c4	HSYNC	c2	GREEN	

[1] +5V protected by a PolySwitch Fuse 0.75A

For attachment of an ordinary analog RGB monitor to the DVI receptacle, there are both adapters and also adapter cables available from DVI-I to the HD-SUB15 connector. Attachment of digital monitors (flat panel displays) should be done by means of a DVI to DVI cable (single link style cable is sufficient).

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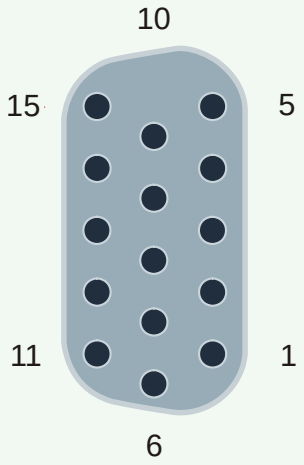
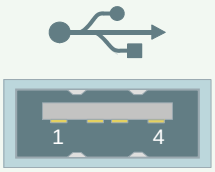
Video Monitor Connector HD-DSUB

As an option, the CC9-SAMBA can be equipped with a legacy VGA connector (High-Density D-Sub 15-position female connector). The VGA connector replaces the DVI receptacle, and the digital video interface therefore is not available with this option.

VGA1 (Option)		
	1	RED
	2	GREEN
	3	BLUE
	4	NC
	5	GND
	6	GND
	7	GND
	8	GND
	9	DDC_POW [1]
	10	GND
	11	NC
	12	DDC_SDA
	13	HSYNC
	14	VSYNC
	15	DDC_SCL

[1] +5V protoected by a PolySwitch Fuse 0.75A

USB Connectors

USB Ports 1/2		
	1	POW [1]
	2	USB DATA NEG
	3	USB DATA POS
	4	GND

[1] +5V protected by an Electronic Fuse 0.5A

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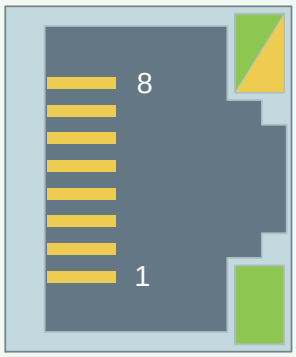
Ethernet Connector

ETH (RJ45)		
	1	MDX0+
	2	MDX0-
	3	MDX1+
	4	MDX2+
	5	MDX2-
	6	MDX1-
	7	MDX3+
	8	MDX3-

The upper green/yellow dual-LED signals 1Gbit/s when lit yellow, 100Mbit/s when lit green, and 10Mbit/s when off. The lower green LED indicates LINK established when continuously on, and data transfer (activity) when blinking. If the lower green LED is permanently off, no LINK is established.

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Internal Connectors

Expansion Interface Header PEXP

PEXPT/PEXPB			
GND	1	2	+3.3V
PCI_CLK	3	4	PCI_RST#
LPC_AD0	5	6	LPC_AD1
LPC_AD2	7	8	LPC_AD3
LPC_FRM#	9	10	LPC_DRQ#
GND	11	12	+3.3V
SERIRQ	13	14	EXP_PME#
EXP_SMI#	15	16	SIO_CLK14
FWH_ID0	17	18	FWH_INIT#
ICH_RCIN#	19	20	ICH_A20GATE
GND	21	22	+5V
USB_EXP_P2-	23	24	USB_EXP_P1-
USB_EXP_P2+	25	26	USB_EXP_P1+
USB_EXP_OC#	27	28	H_DBRESET#
SIO_GPIO16	29	30	SIO_GPIO17
GND	31	32	+5V
AC97_SDOUT	33	34	AC97_SDIN0
AC97_RST#	35	36	AC97_SYNC
AC97_BITCLK	37	38	AC97_SDIN1
SPEAKER	39	40	NC

The expansion interface header is available on both sides of the board, top and bottom, in order to provide attachment of the CCA-LAMBADA either to the left or to the right side of the CC9-SAMBA.

WARNING: Neither the +3.3V pin, nor the +5V pin are protected against a short circuit situation! This connector therefore should be used exclusively for attachment of the CCA-LAMBADA board.

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ATA/IDE Header PIDE

PIDET/PIDEB			
IDE_RST#	1	2	GND
IDES_D07	3	4	IDES_D08
IDES_D06	5	6	IDES_D09
IDES_D05	7	8	IDES_D10
IDES_D04	9	10	IDES_D11
IDES_D03	11	12	IDES_D12
IDES_D02	13	14	IDES_D13
IDES_D01	15	16	IDES_D14
IDES_D00	17	18	IDES_D15
GND	19	20	+3.3V
IDES_DREQ	21	22	+3.3V
IDES_IOW#	23	24	GND
IDES_IOR#	25	26	GND
IDES_IORDY	27	28	+5V
IDES_DACK#	29	30	+5V
IDES_IRQ (INT 15)	31	32	GND
IDES_A1	33	34	IDES_CBLID#
IDES_A0	35	36	IDES_A2
IDES_CS1#	37	38	IDES_CS3#
IDES_ACT#	39	40	GND

Like the expansion interface header the IDE connector is also available on both sides of the board.

WARNING: Neither the +3.3V pin, nor the +5V pin are protected against a short circuit situation! This connector therefore should be used exclusively for attachment of the CCA-LAMBADA board.

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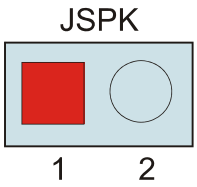
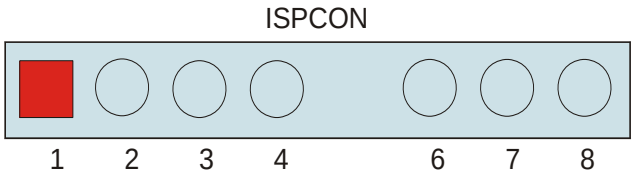
Speaker Header JSPK



1 +5V
2 Speaker

WARNING: The +5V pin is protected against a short circuit situation by a 0.1A PolySwitch. The JSPK connector should be used exclusively for direct attachment of a dynamic speaker device. When connecting to the input of a sound card, most likely a short-circuit situation will occur between the +5V pin of the JSPK connector and the GND pin of the audio-card input, which could cause permanent damage to the CC9-SAMBA and the audio board, despite the PolySwitch resettable fuse. A workaround to this would be to place a 1k resistor across pin 1 and pin 2 of the JSPK connector, and strapping a single wire cable from JSPK pin 2 to the audio input.

PLD Programming Header ISPCON



1 +3.3V
2 serial data out
3 serial data in
4 ispGAL enable
6 mode
7 GND
8 serial clock

Note: The ISPCON is not stuffed. Its footprint is situated at the bottom side of the board.

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Processor Debug Header PITP

PITP	
1	TDI
2	TMS
3	TRST#
4	NC
5	TCK
6	NC
7	TDO
8	BCLKN
9	BCLKP
10	GND
11	FBO
12	RST#
13	BPM5#
14	GND
15	BPM4#
16	GND
17	BPM3#
18	GND
19	BPM2#
20	GND
21	BPM1#
22	GND
23	BPM0#
24	DBA#
25	DBR#
26	VTAP
27	V_{TT}
28	V_{TT}

Note: The Debug Header is situated at the bottom side of the board.

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CompactPCI J1

#J1	A	B	C	D	E
25	5V	*REQ64#* [2]	ENUM# [1]	3.3V	5V
24	AD1	5V	V(I/O)	AD0	*ACK64#* [2]
23	3.3V	AD4	AD3	5V	AD2
22	AD7	GND	3.3V	AD6	AD5
21	3.3V	AD9	AD8	M66EN [3]	C/BE0#
20	AD12	GND	V(I/O)	AD11	AD10
19	3.3V	AD15	AD14	GND	AD13
18	SERR# [1]	GND	3.3V	PAR	C/BE1#
17	3.3V	IPMB SCL [4]	IPMB SDA [4]	GND	PERR# [1]
16	DEVSEL# [1]	GND	V(I/O)	STOP# [1]	LOCK# [1]
15	3.3V	FRAME# [1]	IRDY# [1]	GND	TRDY# [1]
14	KEY AREA				
13					
12					
11	AD18	AD17	AD16	GND	C/BE2#
10	AD21	GND	3.3V	AD20	AD19
9	C/BE3#	*GND* [5]	AD23	GND	AD22
8	AD26	GND	V(I/O)	AD25	AD24
7	AD30	AD29	AD28	GND	AD27
6	REQ# [1]	GND	3.3V	CLK	AD31
5	*BRSVP1A5* [5]	*BRSVP1B5* [5]	RST#	GND	GNT#
4	IPMB PWR	GND	V(I/O)	INTP [1]	INTS [1]
3	INTA# [1]	INTB# [1]	INTC# [1]	5V	INTD# [1]
2	*TCK* [5]	5V	*TMS* [5]	*TDO* [5]	*TDI* [5]
1	5V	-12V	*TRST#* [5]	+12V	5V

[1] This pin is pulled up with 1kΩ to V(I/O). Other pull up resistor values (e.g. 2.7kΩ for V(I/O)=+3.3V) are available on request.
[2] This pin is not used on CC9-SAMBA, but pulled up with 1kΩ to V(I/O). Other pull up resistor valus on request.
[3] This pin is pulled up with 4.7kΩ to V(I/O) and pulled low by a 0Ω jumper on the CC9-SAMBA to force 33MHz operation. Nevertheless 66MHz operation is possible on request.
[4] This pin is pulled up with 2.4k to J1 pin A4.
[5] This pin is not connected.

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CompactPCI J2

#J2	A	B	C	D	E
22	*GA4* [5]	*GA3* [5]	*GA2* [5]	*GA1* [5]	*GA0* [5]
21	CLK6	GND	*RSV* [6] ETH_MX2-	*RSV* [6] ETH_MX3-	*RSV* [6] ETH_MX3+
20	CLK5	GND	*RSV* [6] ETH_MX2+	GND	*RSV* [6] ETH_MX0+
19	GND	GND	*RSV* [6] ETH_MX1-	*RSV* [6] ETH_MX1+	*RSV* [6] ETH_MX0-
18	*BRSVP2A18* [6] VGA_RED	*BRSVP2B18* [6] VGA_GREEN	*BRSVP2C18* [6] VGA_HSYNC	GND	PXI_TRIG6 [3] VGA_VSYNC
17	*BRSVP2A17* [6] VGA_BLUE	GND	PRST# [1]	REQ6# [1]	GNT6#
16	PXI_TRIG1 [3] *BRSVP2A16* [7]	PXI_TRIG0 [3] DDC_SCL [2]	DEG# [1]	GND	PXI_TRIG7 [3] DDC_SDA [2]
15	*BRSVP2A15* [6] IDE_RST#	GND	FAL# [1]	REQ5# [1]	GNT5#
14	*AD35* [1] IDEP_A2	*AD34* [1] IDEP_IOW#	*AD33* [1] IDEP_CS1#	GND	*AD32* [1] IDEP_IOR#
13	*AD38* [1] IDEP_A0	GND	V(I/O)	*AD37* [1] IDEP_DACK#	*AD36* [1] IDEP_CS3#
12	*AD42* [1] IDEP_A1	*AD41* [1] IDEP_D14	*AD40* [1] IDEP_D15	GND IDEP_CBLID#	*AD39* [1] IDEP_D00
11	*AD45* [1] IDEP_D03	GND IDEP_IORDY	V(I/O)	*AD44* [1] IDEP_D01	*AD43* [1] IDEP_D12
10	*AD49* [1] IDEP_D02	*AD48* [1] IDEP_D13	*AD47* [1] IDEP_D05	GND IDEP_DREQ	*AD46* [1] IDEP_D07
9	*AD52* [1] IDEP_D06	GND IDEP_IRQ (INT 14)	V(I/O) IDEP_ACT#	*AD51* [1] IDEP_D04	*AD50* [1] IDEP_D08
8	*AD56* [1] IDEP_D10	*AD55* [1] IDEP_D09	*AD54* [1] IDEP_D11	GND COM1_DSR#	*AD53* [1] COM1_TXD
7	*AD59* [1] COM1_DTR#	GND COM1_CTS#	V(I/O) COM1_RXD	*AD58* [1] COM1_RTS#	*AD57* [1] COM1_DCD#
6	*AD63* [1] USB_J2_P1+	*AD62* [1] USB_J2_P1-	*AD61* [1] USB_J2_P2+	GND USB_J2_OC#	*AD60* [1] USB_J2_P2-
5	*C/BE5#* [1] +5V/1.5A [4]	GND (64EN#) [1]	V(I/O)	*C/BE4#* [1] MS_DATA	*PAR64* [1] MS_CLK
4	V(I/O)	*BRSVP2B4* [6] +5V/1.5A [4]	*C/BE7#* [1] KB_DATA	GND	*C/BE6#* [1] KB_CLK
3	CLK4	GND	GNT3#	REQ4# [1]	GNT4#
2	CLK2	CLK3	SYSEN# [1]	GNT2#	REQ3# [1]
1	CLK1	GND	REQ1# [1]	GNT1#	REQ2# [1]

[1] This pin is pulled up with 1kΩ to V(I/O). Other pull up resistor values (e.g. 2.7kΩ for V(I/O)=+3.3V) are available on request.
[2] This pin is pulled up with 2.7kΩ to +4.3V.
[3] This pin is pulled up with 10kΩ to +5V.
[4] This pin is protected by a resettable PolySwitch fuse.
[5] This pin is not connected.
[6] This pin is not connected in the non rear I/O configuration
[7] This pin is not connected in the rear I/O configuration
[8] Pin positions printed blue: Rear I/O options.

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Power Supply Requirements

Operating Voltage [V]	max Current [A] CC9-1 [1)]	max Current [A] CC9-2 [1)]	min/max Current [A] CC9-3 [2)]	min/max Current [A] CC9-5 [2)]
+5 (+0.25/-0.15)	1.1	1.5	1.0/2.7	1.1/4.8
+3.3 (+0.17/-0.1)	3.0	3.2	2.9/3.2	3.3/3.5
+12 (±0.6) [3)]	0	0	0/0	0/0
-12 (±0.6) [3)]	0	0	0/0	0/0

1) This unit is equipped with a Celeron M processor that does not support Intel SpeedStep®. The load current is measured under maximum load conditions.
2) Minimum current is measured with processor running at minimum core speed (600MHz) and minimum core voltage, but under maximum load condition. Similar maximum current is measured with processor running at maximum frequency and maximum core voltage.
3) This voltage is not necessary to operate the CC9-SAMBA.

Literature

Theme	Document Title	Origin
CompactPCI	*CompactPCI* Specification, PICMG 2.0 R3.0, Oct. 1, 1999	http://www.picmg.org
USB	Universal Serial Bus Specification	http://www.usb.org
CompactFlash	CF+and CompactFlash Specification Revision 2.0	http://www.compactflash.org

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